

WORLDSS

Opening

Virtual World Tour 2020

Day 1
Mon. 2 November



International Laser Ranging Service

ILRS

Recent News

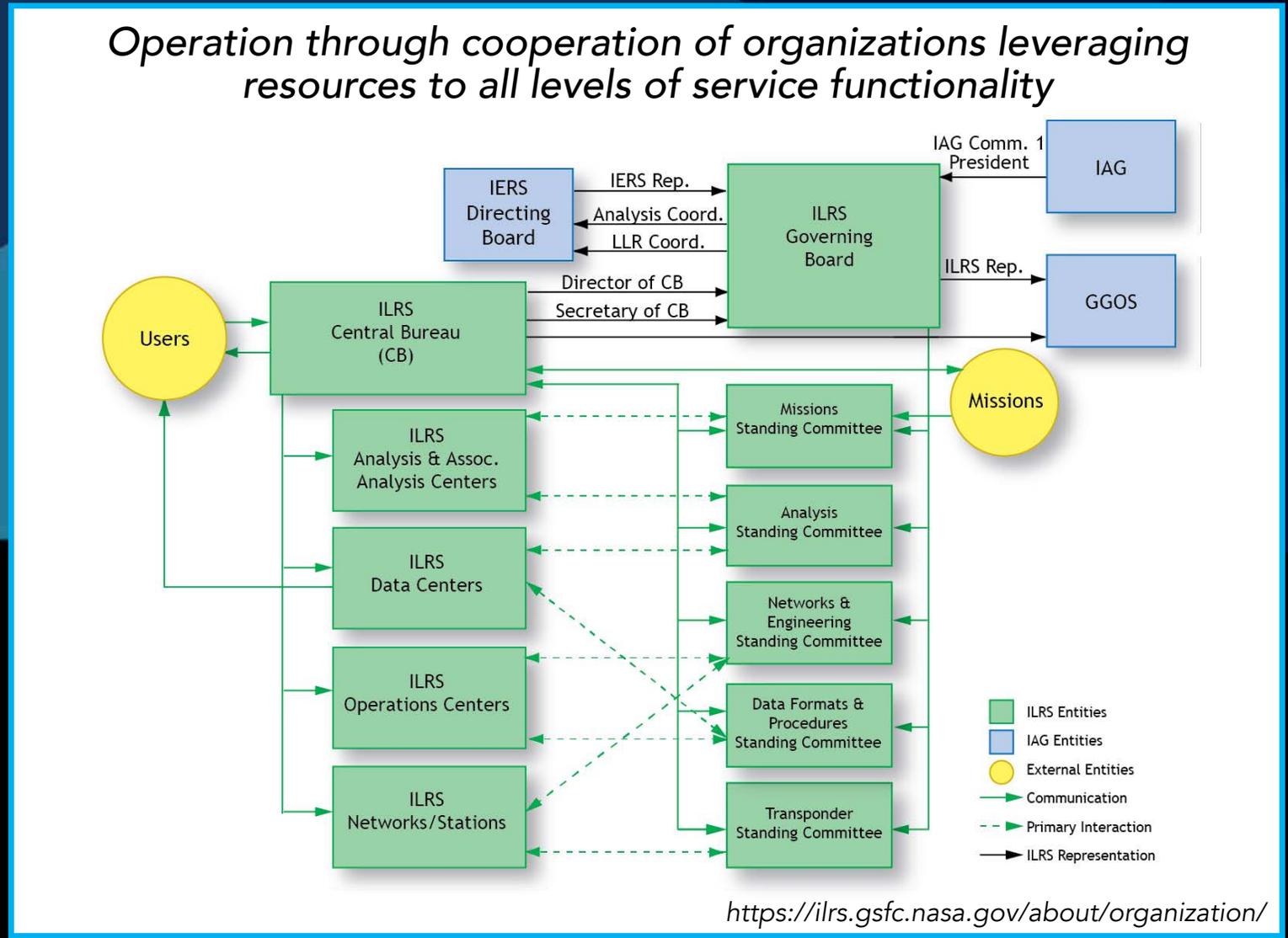
Carey Noll
Michael Pearlman
ILRS Central Bureau

ILRS Virtual World Tour 2020
Opening Session
November 02, 2020

ILRS: large community participation

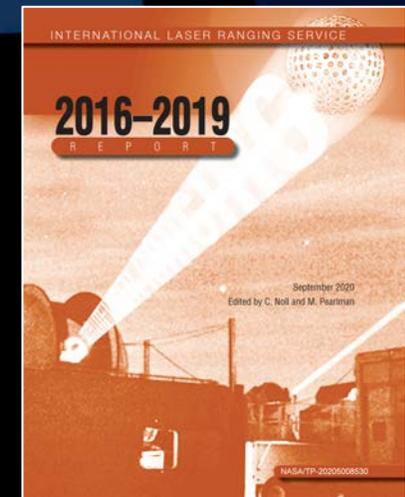
Components:

- Network: 40+ stations
- Data Centers:
 - 2 Operations Centers
 - 2 Data Archive Centers
 - 1 Mirror Data Center
- Analysis Centers:
 - 7 Analysis Centers
 - 2 Combination Centers
 - 22 Associate Analysis Centers
 - 6 Lunar Analysis Centers
- Standing Committees: 5
- Central Bureau: 25+ members
- Governing Board: 18 members
- Membership
 - Associates: 400+
 - Organizations: 110+
 - Countries: 30+
 - Correspondents: 200+
- Supporting:
 - Users: 1000's
 - Missions: 110+



Recent news and highlights

- ILRS network supported by 40 stations
- Network currently tracking over 110 missions
- Future workshops postponed due to Covid-19:
 - 22nd International Workshop on Laser Ranging (Kunming, China in Fall 2021)
 - Next ILRS Technical Workshop (Arequipa, Peru in Fall 2022)
 - ILRS Standing Committees and Governing Board holding virtual meetings in 2020
- Material posted from 2019 ILRS Technical Workshop and first ILRS School
 - https://cddis.nasa.gov/2019_Technical_Workshop/
- Regular meetings of the ILRS Quality Control Board (QCB) have helped identify possible sources of issues in normal point data
- 2016-2019 ILRS report now published on ILRS website:
 - https://ilrs.gsfc.nasa.gov/about/reports/annualrpts/ilrsreport_2016.html
- ILRS Governing Board election for 2021-2022 term now underway



ILRS network



Graz
Austria



Zimmerwald
Switzerland



Simosato
Japan



Greenbelt MD,
USA

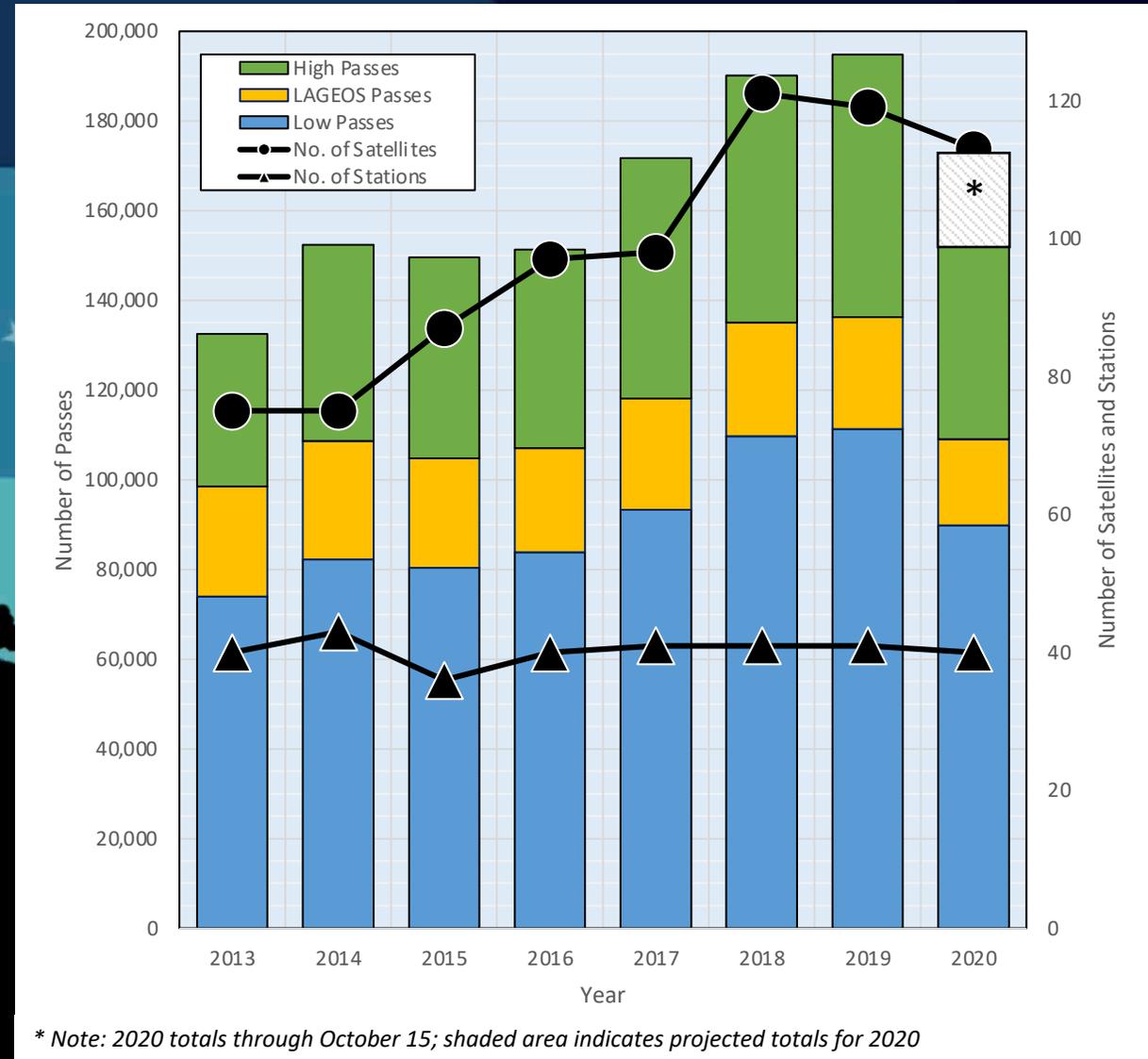


Yarragadee
Australia

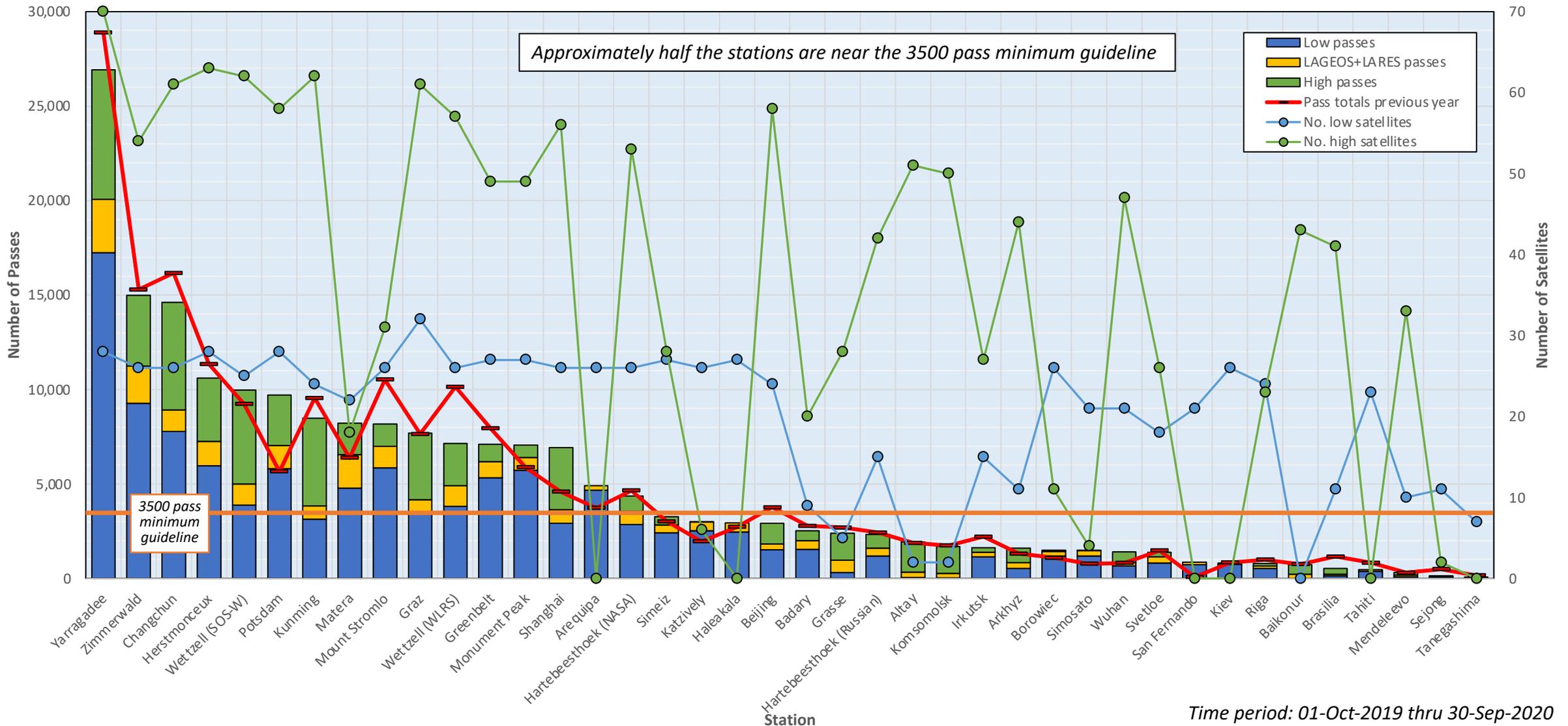


Recent developments: network

- Forty stations are providing data on a routine basis; data from one station currently in quarantine for review
- Some station operations adversely affected by pandemic quarantine; projected yearly tracking value indicates total number of passes for 2020 will be lower than 2019 totals
- Less than half of the 40 stations in the network achieve the ILRS guideline of 3500 passes/year (see ILRS monthly report cards)
- Anticipating nearly a dozen new SLR stations in the next few years; spatial gaps still exist

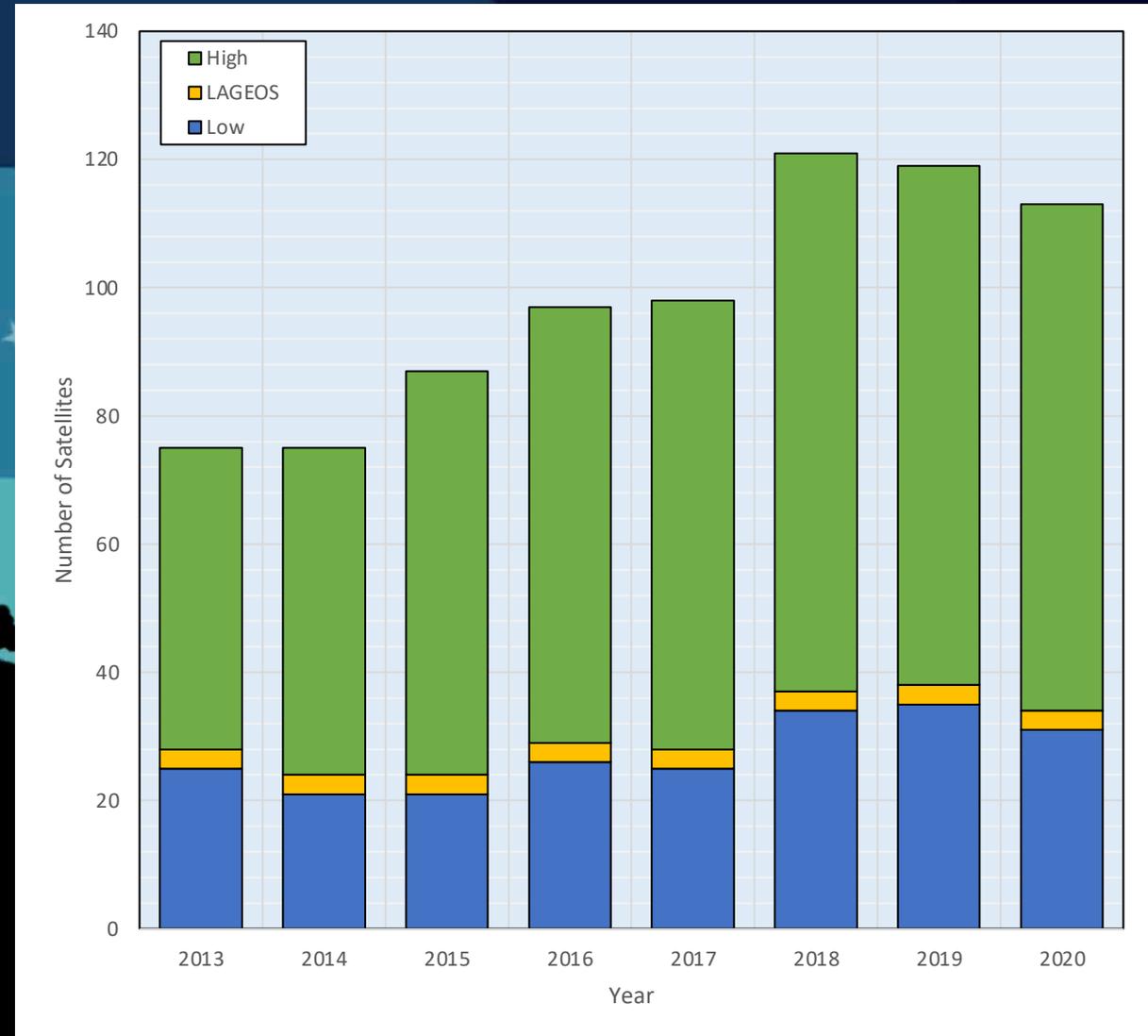


Recent developments: network performance



Recent developments: mission support

- Recent changes to the ILRS priority list:
 - Added HY-2C (altimetry mission)
 - Removed HY-2A
- Future missions requesting ILRS support:
 - Astrocast Precursor (2 cubesats/engineering testing)
 - LARES-2 (2020 Q4)
 - NXD-1/SLAG (2020 Q4)
 - Sentinel-6A/Jason-CSA (November 2020)
 - ELSA-d (2021 Q1)
 - HY-2D (2021 Q1)
 - ICEYE (5 satellites, 2020 Q4)
 - Additional GNSS: BeiDou/Compass, Galileo, etc.
- Requests for restricted tracking, which is time consuming to implement



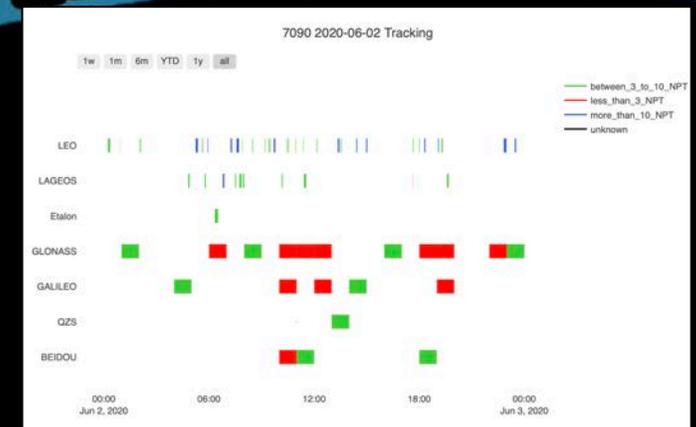
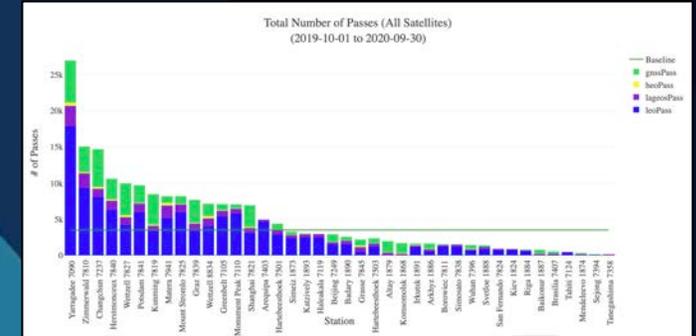
Recent developments: analysis

- ILRS ACs preparing for the data re-analysis for ITRF2020
- Introducing LARES as a 5th target incorporated into ILRS products
- Investigating data yield improvement and use of GNSS tracking data to benefit ILRS EOP products
- ASC Pilot Projects
 - Systematic Error Monitoring Pilot Project completed
 - Low degree/low order gravity field terms
 - NT-Atmospheric loading (possibly other types of loading) applied at observation level
- Implementation of improved satellite Center of Gravity (CoG) values for geodetic satellites and new systematic error modeling have reduced the difference in scale between SLR and VLBI to $\sim .25\text{ppb}$
- Increased data level on Etalon from a 3-month tracking campaign in 2019 resulted in improved EOP; data continues to be sparse



Recent developments: operations

- ILRS infrastructure transitioning to version 2 of both Consolidated Range Data (CRD) and Consolidated Prediction Format (CPF)
 - ★ Updated versions will facilitate support of future missions and applications (e.g., ELT, space debris)
 - Test files available from ILRS data centers
 - Missions asked to provide files in CPF V2 by end of 2020
 - Only 8 stations currently providing CRD V2 data
- New ILRS report card software developed and operational starting in 2020
- Study group currently developing new software to improve plotting of station performance and environmental parameters
 - Help identify station systematics and errors more easily
 - Help motivate stations to improve performance



Future work and prospects

- Network stations continue to explore new applications for SLR:
 - Space debris tracking for better understanding of reentry dynamics and other applications
 - Laser time transfer to improve epoch synchronization
- ILRS Quality Control Board has made big strides in understanding issues found in normal point data:
 - Studies underway to examine different methods for formulating normal points
 - Unreported configuration changes at stations can corrupt data products
 - Long and short-term stability is a better diagnostic tool than NP rms
 - Other data bias issues from calibration techniques, etc.
- Analysis centers developing improved CoM modeling for use in product generation
- New retroreflector configurations implemented in future missions (e.g., LARES-2) to improve ranging accuracy
- Next Generation Lunar Reflector to be deployed on future Moon landing mission will improve ranging accuracy and contribute to lunar studies



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